AMENDMENTS TO THE CLAIMS

1.   (Previously Amended) An apparatus comprising:

   (a)   a memory configured to receive a medical diagnostic image representing a neuro-axis of a patient;

   (b)   a program stored in the memory and operatively configured to detect and label a plurality of spinal structures in said medical diagnostic image using an iterative process;

   (c)   a processor in communication with the memory to perform the program;

   wherein the program is further operatively configured to automatically generate a prescription using said labeling of the plurality of spinal structures.

2. (Original) The apparatus of claim 1 wherein the program is operatively configured to utilize a region growth algorithm to identify a portion of the medical diagnostic image to analyze for the plurality of spinal structures.

3. (Original) The apparatus of claim 1 wherein the program is operatively configured to detect and label a spinal structure based on a landmark, and is further operatively configured to detect and label an additional spinal structure based at least in part on a previously named and detected spinal structure.

4.   (Original) The apparatus of claim 1 wherein the program is operatively configured to detect and label the plurality of spinal structures based at least in part on a landmark.

5.   (Original) The apparatus of claim 4 wherein the landmark is a top spinal structure.

6. (Original) The apparatus of claim 4 wherein the landmark is a seed.

7. (Original) The apparatus of claim 4 wherein the landmark is automaticlly detected.

8. (Original) The apparatus of claim 1 wherein the medical diagnostic image is comprised of a plurality of voxels, and wherein the program is further operatively configured to:

   (a) identify a plurality of voxels in the medical diagnostic image as candidate spinal structures;

   (b) apply a spinal structure constraint to identify a series of spinal structures comprising a subset of said candidate spinal structures.

9. (Original) The apparatus of claim 8 wherein the program is further operatively configured to detect a plurality of voxels in the medical diagnostic image as candidate spinal structures by performing a calculation comprising comparing a voxel in the medical diagnostic image with a voxel in a second medical diagnostic image wherein the second medical diagnostic image corresponds to a sagittal section adjacent to a second section corresponding to the medical diagnostic image.

10. (Original) The apparatus of claim 8 wherein the program is further operatively configured to

    (a) identify a line defined in part based on a centroid of a candidate spinal structure in the series of spinal structures;

    (b) identify an additional spinal structure by searching for a local intensity maximum along a region defined in part by the line.

11. (Original) The apparatus of claim 10 wherein the region defined in part by the line is defined in further part by extending the line based on an estimate of a position for the additional disc.

12. (Original) The apparatus of claim 10 wherein the region defined in part by the line is defined in further part by an additional line, the additional line being parallel to the line.

13. (Currently Amended) The apparatus of claim 1 wherein the medical diagnostic image corresponds to a superior portion of the neuro-axis, and wherein the program is further operatively configured to combine the medical diagnostic image with a second medical diagnostic image corresponding to an inferior portion of the neuro-axis.

14. (Original) The apparatus of claim 1 wherein the program is further operatively configured to analyze a spinal structure from the plurality of spinal structures.

15. (Original) The apparatus of claim 1 wherein the program is further operatively configured to produce a report based at least in part on the naming of the plurality of spinal structures.

16. (Original) The apparatus of claim 1 further comprising a printer operable to produce a labeled visual representation of the medical diagnostic image on film.

17. (Original) The apparatus of claim 1 further comprising a screen operable to display the labeled visual representation of the medical diagnostic image.

18. (Canceled)

19. (Previously Amended) The apparatus of claim 1 wherein the prescription is to collect additional medical diagnostic images.

20. (Previously Amended) The apparatus of claim 1 wherein the prescription is for a therapeutic procedure.

21. (Previously Amended) The apparatus of claim 1 wherein the program is further operatively configured to execute the prescription.

22. (Original) The apparatus of claim 20 wherein the apparatus further comprises a therapeutic instrument and wherein the program is operatively configured to execute the prescription using the therapeutic instrument.

23. (Original) The apparatus of claim 1 wherein the program is further configured to reconstruct a slice by selectively applying a plurality of reconstruction algorithms based at least in part on the detection and labeling of the plurality of spinal structures.

24. (Previously Amended) The apparatus of claim 1 further comprising a screen wherein the program is operable to display a visual representation of the medical diagnostic image using a first contrast and a second contrast, wherein the first contrast is used for portions of the visual representation corresponding with bone and wherein the second contrast is used for portions of the visual representation corresponding with soft tissue.

25. (Original) The apparatus of claim 24 wherein the first contrast and the second contrast are adjustable.

26 - 44. (Canceled)

45. (Previously Added) An apparatus comprising:
    (a) a memory configured to receive a plurality of medical diagnostic images of a patient's neuro-axis;
    (b) a program stored in the memory and operatively configured to:

(i) generate a composite midline sagittal image volume of the neuro-axis by combining two or more medical diagnostic images from the plurality of medical diagnostic images, wherein the generated composite midline sagittal image volume includes at least a portion of all interspaces and vertebrae between the patient's axis (C-2 vertebra) and sacrum; and,

(ii) identify a plurality of spinal structures in the composite midline sagittal image volume by iteratively searching for a predefined search number of spinal structures between the patient's axis (C-2 vertebra) and sacrum, wherein the spinal structures are taken from the set of spinal structures consisting of:

(1)   intervertebral discs; and

(2)   vertebrae;

and wherein, if the spinal structures are vertebrae, the predefined search number is 22, otherwise, if the spinal structures are intervertebral discs, the predefined search number is 23; and

(iii) determine if a set of predefined criteria are met and, if so, allowing the predefined search number to vary by one;

(c)   a processor in communication with the memory to perform the program.

46.   (Previously Added) The apparatus of claim 45, wherein:

(a) if identifying the plurality of spinal structures in the composite midline sagittal image volume comprises identifying the predefined search number of intervertebral discs, the program stored in memory is operatively configured to, after identifying the plurality of spinal structures:

(i)   based on labeling a cephalad disc from the plurality of intervertebral discs as C2-3, consecutively label the remaining discs from the plurality of intervertebral discs in a cranial-caudal fashion as C3-4 through L5-S1; and

(ii)   provide vertebrae adjacent to the plurality of discs with corresponding labels: C2 through S I;

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(b) if identifying the plurality of spinal structures in the composite midline sagittal image volume comprises identifying the predefined search number of vertebrae, the program stored in memory is operatively configured to, after identifying the plurality of spinal structures:

(i) based on labeling a cephalad vertebra from the plurality of vertebrae as C2, consecutively label the remaining vertebrae from the plurality of vertebrae in a cranial-caudal fashion as C3 through S1; and

(ii) provide intervertebral discs adjacent to the plurality of vertebrae with corresponding labels C2-3 through L5-S1.

47. (Previously Added) The apparatus of claim 45, wherein:

(a) identifying the plurality of spinal structures in the composite midline sagittal image volume comprises, based on labeling a top spinal structure, iteratively search for the predefined search number of spinal structures in a cranial-caudal fashion until the predefined search number of spinal structures is identified; and

(b) the program stored in memory is operatively configured to, as each spinal structure is identified, labeling that spinal structure.

48. (Previously Amended) The apparatus of claim 45, wherein:

(a) the composite midline sagittal image volume comprises the patient' head; and

(b) the program stored in memory is operatively configured to uniquely identify a plurality of head structures in the composite midline sagittal image volume.

49. (Previously Added) The apparatus of claim 45, wherein the program stored in memory is operatively configured to perform an automated image analysis at each disc and vertebral level in patient's neuro-axis.

50. (Previously Added) The apparatus of claim 45, wherein the program stored in memory is operatively configured to create an optimized reconstruction of a volumetric image dataset of the patient's neuro-axis based at least in part on identification of the plurality of spinal structures in the composite midline sagittal image volume.

51. Canceled

52. Canceled

53. Canceled.

54. Canceled.

55. Canceled.

56. Canceled.